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KEY/FOB AND/OR RELEASE COMPONENT FOR OPERATING A MOTOR VEHICLE WITH A
DISPLAY ARRANGEMENT, AUTOMATIC PARKING MACHINE, AS WELL AS METHOD FOR
USE THEROF

[SCHLUESSEL/ANHAENGER UND/OR FREIGABEBAUTEIL ZUR BEDIENUNG EINES
KRAFTFAHRZEUGES MIT EINER ANZEIGEVORRICHTUNG, PARKAUTOMAT SOWIE
VERFAHREN ZU DEREN GEBRAUCH]

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The invention concerns device corresponding to the preamble of Claim 1 (key), the preamble of Claim 22 (key fob), the preamble of Claim 42 (automatic parking meter), the preamble of Claim 44 (display arrangement), and the methods according to Claims 53 to 57.

Area of Application

Because of the lack of public parking places, in particular in densely populated areas, many parking places are available for motor vehicles for only a limited period of time. Usually a fee that depends on the parking time must be paid for parking a motor vehicle in public parking places or parking garages. In this case automatic parking permit machines serve as automatic machines for selling a permit to use parking places for a limited time.

Parking meters are used at individual parking places for monitoring parking time in a similar way. Frequently the use of a parking token in the sense of the Highway Traffic Ordinance is required at toll-free parking places. Many cities grant vehicle-specific passes for residential areas, so-called resident parking passes.

Parking is connected with certain burdensome tasks for the driver, such as, for example, searching for the pay station, paying a parking fee, placing ticket in the vehicle, noting parking time, etc.

In particular, the driver today almost always must make sure that he does not exceed a maximum parking time for a parking place in order to

*Numbers in the margin indicate pagination in the foreign text.

prevent paying a very high parking fee, warning or penalty fee.

Since the actual process of parking is a rather minor or entirely unimportant activity for most drivers within their daily tasks, many drivers pay no or only little attention to the tasks, in particular monitoring the parking time, connected with parking. This also explains the fact that the motor vehicle owners in the FRG annually pay multi-digit millions in fines for exceeding parking time.

The situation where the driver unintentionally exceeds the parking time planned at the beginning of parking or the prescribed parking time because of the hectic nature of his daily activity is an everyday occurrence. In the best case this leads to increased parking fees, and in the regularly occurring worst case to a fine for overtime parking or even to towing of the vehicle.

So-called automatic parking permit machines that sell parking permits are known. These automatic parking permit machines are used for monitoring a plurality of parking places. After selecting the parking time the payment is made, for the most part with coins. Then these automatic parking permit machines print a parking permit on which the parking time is indicated. These parking permits are to be placed inside the vehicle so that they can easily be monitored from the outside. An improved automatic parking permit machine is described, for example, in DE 196 42 932. It is very disadvantageous for the driver that, after parking and locking the vehicle, he first has to find the automatic parking permit machine in order to buy a parking permit, and then has to return to his vehicle to unlock the

vehicle again, place the parking permit in the vehicle correctly, and then lock the vehicle again. Often payment can be made only by inserting coins that frequently are not available in the desired kind and/or amount. If the parking permit does not have a separable section, the driver has to write down or remember the printed parking time. Often there is nothing available, or there is no time available, for writing anything down. Further more, there are known to be parking meters that are used for monitoring one or even a few individual parking places. These parking meters have one or a few displays, which display the current remaining parking time in each case for the parking place or places to be monitored. Here also the driver is forced to pay with coins and to write down or remember the chosen parking time, for example 45 minutes and the time of beginning parking. If he does not have a watch available at the time, he cannot determine at all the end of the parking time that he must avoid exceeding. Devices such as automatic parking permit machines or parking meters or similar devices are hereinafter called automatic parking machines. Some parking places are to be allowed to be fee-free with the use of a parking disk in accordance with the Highway Traffic Ordinance. For this a parking disk made in accordance with the law is to be set to the beginning of parking time. The parking disk is to be placed in the vehicle so that it can be read from the outside. In the case of the usually used parking disks, the complicated, unreliable operation and required placing and removal in the disk area or on the dashboard of the motor vehicle is

disadvantageous. There are known to be electric/electronic parking disks, which automatically set the beginning of parking time, for examples of this see EP 0 513 429 or DE 196 08 341. A further, improved parking disk is proposed in DE 197 25 209. It is disadvantageous that such automatically perform their function after each parking of the vehicle, independent of the parking site. However, this is often not desired. There is a potential danger of the driver forgetting to manually set such parking disks because he is in a hurry.

It is a disadvantage of all proposed electric/electronic parking disks that, as a result of their construction, they cannot provide good legibility of the beginning of parking time during parking with high transparency of the display area during driving. Other arrangements for displaying parking times, e.g. from the US area, have the disadvantage that they cannot produce the legally prescribed form of a parking disk and/or are mounted on the outside of the vehicle so that damage to the sensitive electronic components (e.g. LCD module) by outside influences is not excluded. A further essential disadvantage is that none of the proposed display arrangements can receive any data (e.g. a time moment or time span). Accordingly, they also cannot be used in a simple way to present the information of a parking permit (in particular the end of the parking time). Thus they cannot be used as an "electronic parking permit".

Furthermore it is known that many cities and communities have reserved parking areas exclusively for residents. For this the

residents obtain from the authorities a resident parking certificate that has to be placed within the vehicle so that it is easily legible from outside. If the certificate is attached fixed to the windshield of the vehicle, it limits the driver's visual field. If it is placed on the dashboard, it disturbs the driver by sliding during driving and by glare at night. This situation leads to the fact that the driver removes the certificate from the visual range during driving. Then /2 he is forced to remember to return his resident parking certificate into visual range when parking his vehicle in the authorized parking place. This process is forgotten only too often in the everyday hurry. This problem also appears in the case of the classic parking disks.

The driver can help himself to monitor the parking time and the end of the parking time in makeshift fashion with a wristwatch or public clocks, if they are available. In each case the driver is required to first determine the beginning of the parking time and the end of the parking time, and to record them in some form or to remember them. If a wristwatch permits the simple entry of an alarm time, the end of the parking time can be manually entered as an alarm time. However, it does not provide information about the remaining parking time in a simple way. If there is a removable section of the parking permit on which the end of the parking time is printed, it is often hastily stuck into some pocket and not found again. That the above-mentioned aids for monitoring the parking time are fairly unsatisfactory can be easily deduced from the enormous number of

overtime parking offenses.

Because of the different methods for issuing and using parking areas and legal provisions, parking entails a number of burdensome tasks for the driver. He has to keep ready, constantly operate, and take out and put away different items (parking disk, parking permit, resident parking certificate, parking money, possibly a wristwatch). The driver must always make sure that he does not exceed a parking place-specific end of parking time.

Keys for operating vehicles, for example from DE 197 29 867, with remote control transmitter and identification information, are known.

These keys send a signal to a receiver on or in the vehicle, that starts the door locking or unlocking process by wireless information transmission. For identifying an authorized user with respect to the electronic anti-theft lock (EWS), these keys contain a transponder that communicates wirelessly with one or more sender/receiver unit(s) (hereinafter called transceiver(s)) located in the vehicle or only read out the information thereof.

A key with a transponder that is used for storing comprehensive data is known from DE 196 48 042.

A release component, that can replace the conventional keys, is known from DE 197 38 323. This release component, also called a "SmartCard" or identification card, communicates with transceivers, that are mounted in and/or the vehicle. As soon as the release component is brought into the starting release area of the vehicle, the vehicle is unlocked and can be started without further aids. From

the technical point of view these vehicles do not require any further device for starting the motor. These also are called keyless entry systems.

When the term "key" is used below, it means any mobile device that is used for locking/unlocking and/or starting and/or operating and/or controlling a motor vehicle or parts thereof, in particular mechanical keys, electronic keys, release/identification devices such as, for example SmartCards and combinations of the above-mentioned devices.

The object of the invention is to simplify the parking process at different sites with different requirements and to assure that the driver is informed concerning the expired parking time in the simplest way and reliably warned before the maximum parking time is exceeded.

The object is achieved according to the invention by means of a key, alternatively by means of a key fob, a display arrangement, an automatic parking machine, and several methods for using these arrangements. The key normally serves for locking/unlocking the motor vehicle and for operating the ignition lock. Furthermore, according to the invention the key serves as an operating device for a display arrangement located in or on the motor vehicle, for parking money/parking time storage, parking data storage, and as a parking time monitoring device. In order to achieve the object, the invention discloses that the key has at least one display, a microprocessor with timer and memory, several control devices, a signal emitter, and a microphone, that the key has a transmitter for operating at least one

display arrangement located in the motor vehicle, that the display arrangement is designed so that it can wirelessly receive data and commands, can be freely programmed by means of an external computer, can present any information, and is nearly invisible during driving as a result of its construction and/or the arrangement of its construction in the vehicle, that the automatic parking machine has devices for data transmission from and/or to the memory of the key and/or at least one display arrangement mounted in the motor vehicle.

Claims 1 (key), 22 (key fob), 42 (automatic parking machine), and 44 (display arrangement) in each case characterize a first embodiment of the arrangements for achieving the object of the invention. The method according to Claims 53 to 57 describes a first procedure for operating the above-mentioned arrangements.

The key contains at least one memory, preferably in the form of a transponder that can be read and written by devices in and/or on and/or outside the motor vehicle, for example locks or transceivers. In a special embodiment the transponder is the same one that is used for identification within the framework of the electronic switching system. This version offers special economic advantages.

Furthermore, according to the invention the key has a transmitter, that wirelessly, for example by ultrasound or by transmitting electromagnetic waves, transmits data and/or commands to at least one display arrangement mounted in or on the vehicle.

A preferred embodiment utilizes the same transmitter that is used in a known way for remote actuation of the central locking system

and/or the alarm system of a motor vehicle. In this case the data specified for the display arrangement installed in the motor vehicle are transmitted via a direct electric connection from the receiver of the central locking/ alarm system to the display arrangement. This version offers particular economic advantages.

Furthermore, according to the invention the key has at least one display of any kind, preferably made as an LCD module, for presenting information. This display can be used during parking for presenting time information. In particular, made as an LCD module, it can serve for presenting the beginning of parking time, the parting time so far, the current time of day, the remaining parking time, the end of parking time, and the amount of the parking money/parking time account. The switching for presenting the different times and/or other information and/or other information can take place /3 automatically in the exchange or by operation by means of the control devices. However it is particularly advantageous if the display also can be used for nearly any other kind of information.

In particular, there are many additional possibilities if the memory is made as a transponder. For example, the first name of the key owner could be displayed, which acquires special significance within the framework of personalizing motor vehicles (e.g. personal adjustment values for seat and mirror positions), because having other unauthorized persons inadvertently use a "personalized" key must be avoided. However, it is also conceivable that, for example, the identification number or last name of the owner be displayed on the

display during the time the vehicle is in a repair garage, which would considerably facilitate the handling of the large number of keys in the garage. However, it is also conceivable to wirelessly transmit the information concerning the status of individual vehicle components, for example the tire pressure, to the key transponder, and have it be visibly presented on the display. Furthermore, standard adjustment values (e.g.. the permissible tire pressure) can be stored in the memory. In the case of a significant deviation of the displayed tire pressure, the key can transmit warnings over the display and/or the signal transmitter.

In a larger parking garage or parking lot, it is often difficult for a driver to find his vehicle again after a long parking time without information about the parking place. If these data are stored in the key (either wirelessly transmitted by a transceiver or manually via the control device), these data can be called up later on the display, preferably after entry of a security code.

However, the display can be made very simply, for example in the form of individual LED's, that, for example, in each case symbolize a specific time section. However, the display also could be made so that, for example, the color or shape of the display is changed in a chemical or physical way time-dependently, which symbolically shows the passage of time or the level of the parking money/parking time storage.

The key can be operated via any number of known operating devices, such as, for example, keys, switches, turning knobs, slides,

or a combination thereof. A preferred embodiment makes it possible to perform the operation, at least partially, via speech entry and processing electronics. This module makes operation possible via verbal human speech and/or tones/tone sequences (e.g. whistling). In this case simple operation and data input via short speech commands is particularly advantageous. In a further specific embodiment, parts of the signal transmitter and/or a memory can also be used to utilize the key additionally as a voice recorder (speech recording and reproduction device). Therefore this is particularly disadvantageous because many automobile drivers want to obtain important information in a simple way while driving. However, it is often also desirable for the driver to be able to record local information verbally, which he can later call up, preferably after inputting a code.

In the simplest case, the system clock of the microprocessor can serve as the timing device. In another embodiment, it is made independently of a timer, microprocessor, and associated memory. In this case it forms a complete, autonomous clock, that makes it possible to display the actual clock time independently of existing components or data transmissions from the vehicle or the automatic parking machine. In a specific embodiment, this clock contains a receiver for receiving radio clock signals.

The signal transmitter of the key serves for transmitting optical and/or acoustic and/or vibration signals, for example in order to inform the driver concerning an operation performed, warning him about exceeding the parking time, or indicating a problem with a vehicle

component to him.

In a specific embodiment, the driver can select the use of different signal sources and intensity thereof, so that in this way it is assured that the signal transmission does not cause interference in certain situations. In a particularly advantageous embodiment, the signal transmitter first detects the environmental conditions (noise level, light conditions) via corresponding sensors, in order then to dynamically adjust the intensity of the signal or signals to the prevailing environmental conditions. The number and the spacing of the alarm times that remind of the expiring parking time can be freely programmable. Thus it is assured that the driver, as desired, is reliably warned several times concerning the expiring parking time or the end of the parking time.

The energy storage provides the energy necessary for the operation of the key. In a particularly advantageous embodiment, the energy storage is charged during parking by solar cells and/or devices that convert the motion energy of the key into electric energy (for example, pendulum/flywheel devices). In another embodiment, the energy storage is charged via the vehicle electrical system the electric storage is charged during driving via a direct electric connection with the ignition lock, or inductively via the automobile electrical system.

The term automatic parking machine is used below to mean all devices that make it possible to park vehicles by paying a fee for parking lots provided for this, in particular parking meters and

automatic parking ticket machines.

In accordance with the invention the automatic parking machine is equipped with one or more data transmission devices for communication between the automatic parking machine and the key according to the invention. These data transmission devices make it possible to charge the electronic parking money/parking time account, that is recorded in the memory of the key, after payment by means of coins, paper money, money/credit cards at the automatic parking machines for several parking procedures and/or to deduct the parking fee/parking time for an individual parking procedure from the electronic parking money/parking time account of the key and/or to transmit parking data (beginning of parking, end of parking, parking duration, location, etc.) into the memory of the key and/or to transmit a vehicle/display code from the memory of the key to the automatic parking machine.

The data transmission can take place mechanically via contacts. In an advantageous embodiment the data are transmitted wirelessly from a transceiver in the automatic parking machine to the memory of the key made as a transponder.

In these previously described versions of the automatic parking machine it is necessary for the driver to return to the vehicle with his key in order then to transmit the end of the parking time wirelessly to the display arrangement of the vehicle.

In a preferred embodiment the automatic parking machine also is provided with a radio transmitter, which makes it possible to transmit the end of the parking time by radio to the display arrangement, which

in this case is equipped with a corresponding radio receiver. In /4
this case the driver can leave the parking area immediately after
paying the parking fees. The corresponding vehicle is identified by a
vehicle/display code being sent from the radio transmitter of the
automatic parking machine at the end of the parking time, so that the
radio signal is evaluated only by the corresponding vehicle with the
corresponding display arrangement, that has this vehicle/display code,
and leads to the display of the end of the paid parking time.

The display arrangement according to the invention serves for
presenting a legally authorized electronic parking disk or an
electronic residential parking permit or any other information, e.g.
advertising information, during parking, depending on the location.
The display arrangement consists of a control device, made of a
microprocessor, memory, receiver(s), operating element(s), and
interface, as well as a display arrangement. In one embodiment
version the display arrangement according to the invention consists of
one or more LCD display modules, one or more illumination devices, and
one or more switchable layers. The display arrangement in this
version is suited for being placed on or inside the window glass of
the motor vehicle. The use of switchable layers assures that a very
high transparency and good legibility is assured according to the mode
of operation. The switchable layers can be made as electrochrome or
gasochrome, or otherwise.

In a preferred embodiment the display arrangement is made of a
projector and a projection screen within or on the glass. In one

specific embodiment the projection screen is capable of having the optical properties for a projection required during projection as a result of an optical process, for example integrated holographic-optical diffraction grating. Thus an outstanding legibility is assured without impairing the visual field of the driver during driving.

In a further embodiment, at least the control device of the display arrangement is easily removable from the vehicle and can be programmed via the interface by an external computer. The programming of the "resident parking certificate" presentation can be performed by an official agency in a simple and reliable way.

If the display arrangement is not connected to the vehicle electrical system, the display device receives orders and/or data from the key and/or the automatic parking machine via its own integrated receiver. In another embodiment there is a connection to the vehicle electrical system, and the display arrangement receives the data intended for it via the receiver of the central locking system, or via a transceiver installed in the vehicle within the framework of further objects.

In a preferred embodiment, orders and/or data that are emitted by the automatic parking machine are directly received and processed via a radio receiver integrated in the control device.

Altogether the display arrangement offers the advantage that, depending on each situation, it presents the correspondingly required parking data in such a way as is legally required for monitoring

purposes. Thus it fulfills the role of several formerly necessary auxiliary devices. By the automated data transmission, adjustment, and operation it very decisively relieves the driver from tasks that he easily forgets. In particular, the display of an "electronic parking permit" has the advantage that the driver does not have to make an extra trip back to his vehicle in order to unlock the vehicle, place the parking permit correctly, possibly remove old parking permits, and to relock the vehicle. In addition, it is far easier for the employees of the parking authorities to read the "electronic parking permit", than to read a printed parking permit, that lies wherever possible in any position on the dashboard beside a collection of old parking permits.

According to the invention it is provided that the driver must send an order to the display arrangement that specifies the mode of operation (e.g.: parking meter or parking permit), with the order for locking the motor vehicle. This assures that the driver must consciously decide on a type of presentation. Thus forgetting the setting, for example, the parking permit function, is nearly excluded.

The use of the devices described above: keys, display arrangement, and automatic parking machine decisively relieves the load on the driver during ordinary parking procedures. In particular, the driver is relieved of all the tasks in which he has to rely on his memory during the hectic activity of everyday life.

In this case the key is the ideal component for operating the display arrangement, the automatic parking machine, for monitoring the

parking time and the parking money/parking time account. Naturally it is urgently necessary for the driver to always keep the key with him during parking, since he otherwise cannot reopen or operate the vehicle at the time of returning. This assures that the driver always has his parking money and the control and parking time monitoring device in his immediate personal vicinity and thus is reliably informed about the parking time/remaining parking time and is impressively warned before the end of the parking time is exceeded. By charging the parking money/parking time account shown in the key it is possible to pay for many individual parking procedures simply by passing the key through the transceiver field of an automatic parking machine. In a particularly advantageous way the invention utilizes the already existing components of the key, that are necessary for locking and/or the identification within the framework of the anti-theft lock. A further, essential advantage is that the procedures otherwise necessary at the time of parking, such as setting the ignition lock to zero and paying parking fees are used for transmitting the necessary parking data, and thus completely automating the monitoring of the parking time. In this way the driver is entirely freed of the task of remembering these times in any way.

A particular economic advantage of the invention lies in the embodiment versions in which the current clock time and the maximum parking time or the end of the parking is wirelessly transmitted to the key, since in this case a complete electronic clock and control element can be avoided.

Within the framework of the invention, one embodiment of the invention may be only the display as the sole additional component of known keys for motor vehicles. Further, within the framework of the invention there is the possibility of making the additional capabilities of a motor vehicle key described according to the invention, which goes beyond the known prior art, in a key fob, that is made with the same features as were described above as components of the key. Then, for example, the key fob can be made out of a compact plastic housing, in which the electronic components are embedded.

The invention is explained below by means of only one drawing /5 showing only one specific embodiment, in particular the features of the individual devices presented are not necessarily required for the realization of the invention. The use of some individual devices (e.g. the key) also is provided within the framework of the invention.

The example was chosen in the form that has a mechanical/electronic key with a key bit, transponder and remote control electronic components for operating the central locking system and the vehicle, which key is equipped with the features according to the invention. The procedure describes the situation of a driver, who parks his motor vehicle at a public parking lot provided with an automatic parking machine according to the invention.

Here:

Fig. 1 shows a motor vehicle with a central locking system and display arrangement in a top view,

Fig. 2 shows cross-sectional view of a key,

Fig. 3 shows a front view of a key,

Fig. 4 shows a back view of a key,

Fig. 5 shows an automatic parking machine,

Fig. 6 shows a display arrangement: electronic parking permit
(1),

Fig. 7 shows a display arrangement: electronic parking permit
(2).

Fig. 1 first shows the motor vehicle (1) which is equipped with a display arrangement according to the invention and a central locking system. Within the framework of the display arrangement, a part of the dashboard is used as a projection screen. For this purpose the projection screen is provided with a full-screen switchable LCD module (3). Furthermore, the display arrangement includes a control device with a radio receiver (4) and a projector (2). A receiver (6) with infrared detector (7) is located in the motor vehicle (1) as part of the remote actuation device for the central locking system. Furthermore, in the vehicle there is an ignition lock (8) in the vicinity of which there is a transceiver (5). A key (9) shown in **Fig. 2**, **Fig. 3**, and **Fig. 4** belongs to the motor vehicle (1). The key (9) contains a transmitter with infrared diode (10) as components of the remote locking device. Furthermore, within the key (9) there is an energy storage (11), that is charged via a solar cell (12) and through an electric connection (19) via the ignition lock (8) from the vehicle electrical system, a microprocessor with timer and memory (13), a

transponder (14), that, among other things, contains the data for identification within the framework of the electronic anti-theft lock, a signal transmitter, that is formed by means of microprocessor (13), loud speaker (16), microphone (17), and LED (18).

If the key (9) is brought into the park position of the ignition lock (8) at the time of beginning parking, the current vehicle clock time is stored as the beginning of parking time in the transponder (14) by the transceiver (5). Now, if the key (9) is removed from the ignition lock (8) of the vehicle (1), the energy supply of the energy storage (11) through the ignition lock (8) via the connection (19) is interrupted. Now the transmitted clock time, e.g. "12:32," appears with the indication "PA" (for beginning of parking) on the display (20) of the key (9). After the driver has left the vehicle (1), he operates the selection key (21) to the position "PA" for automatic parking machine. Depending on this position of the selection key (21) the transmitter (10) sends a signal via the IR diode. The signal is received and evaluated via the infrared detector (7) by the receiver (6). At least one part of the signal depends on the position of the selection key (21). The receiver (6) evaluates the signal, locks the vehicle (1), and sends a command to the control device (4) of the display arrangement. The projector (2) now projects an "electronic parking permit" with the time indication "00:00" to the LCD module (3). Up to this moment the projection screen is black, as is the entire dashboard, since the LCD module (3) is still without power and thus is transparent. With the appearance of the projection beams onto

the LCD module (3) the internal sensors, not shown here, determine that the projection has begun and the LCD module (3) is switched. The projection screen immediately turns milky white so that the data projected from the projector (2) are easily legible from outside the vehicle (1), see **Fig. 6**. Now the driver takes the key (9) to the automatic parking machine (25). Before he selects a parking time via the control field (26), he ascertains by the image of his key on the display (20), the approximate level of his "electronic parking money account" depicted in the key. By the position of the black bar "K" in the display (20) he immediately finds that around DM 30.- of funds are still present in the parking money account in the transponder (14). He now selects a parking time of 2 hours via the operating field (26) of the automatic parking machine (25). The parking fee in the amount of DM 3.- and the end of the parking time: 14:35, thereupon is indicated in the display (27) of the automatic parking machine (25). He now moves his key (9) in front of the characterized transceiver field (28) of the automatic parking machine (25). Now the vehicle/display code is read and the sum of DM 3.- is deducted from the parking money account depicted in the transponder (14) of the key (9). Then the end of the parking time is transmitted to the corresponding area of the transponder (14) of the key (9). Then the radio transmitter (29) of the automatic parking machine (25) sends a signal consisting of the vehicle/display code and the end of the parking time, to the receiver of the control device (4) of the display arrangement. The control device (4) next verifies the code signal.

The correct vehicle/display code was received. Now the end of the parking time is projected onto the LCD module (3) of the display arrangement by the projector (2). The complete "electronic parking permit" now can be read outside the vehicle (1), as shown, for example, in Fig. 7. After this successful conclusion of the data transfer, the automatic parking machine (25) sends a short control signal via its signal transmitter (30), and the key (9) sends a short control signal via its signal sources (16, 18).

Now the display (20) "14:35" with the symbol "PE" , that is, end of parking time, appears in the display (20) of the key (9), and the parking time bar (T) is in its full length. The driver now leaves the parking area on foot. While he is doing his errands, the parking time is monitored by the time counter of the key (9) made up of a microprocessor, timer, and memory (13). By pushing the button (22), the following data are displayed on the display (20) of the key (9) one after the other: first name of the owner: "Moni", beginning of parking time: "12:32, PA", parking time up to now: "01:24; PD", remaining parking time: "00:36; PR", end of parking time: "14:35; PE", and parking funds: "27.00; DM". Every 30 minutes of the now expiring parking time, the key (20) transmits a 2 second long signal via its signal sources (16, 18). During the parking process the driver makes sure of the approximate remaining parking time by a short glance at the parking time bar "T" in the display (20) of the key (9). With increasing parking time the length of the darkened parking time bar "T" decreases. Thus he finds that he still has around 60% of his

parking time available. After expiration of 85% of the selected parking time, and after previously determining the environmental conditions, the key (9), via the signal sources (16, 18) emits /6 signals around 5 seconds long to warn of the approaching end of the parking time. The driver now returns to his vehicle (1) on foot. He notices a poster concerning a show. The driver pushed the button (23) and dictates a short message into the microphone (17) of the key (9).

The spoken message is stored in an area of the microprocessor (13) memory reserved as speech storage. After the expiration of the entire parking time the signal sources (16, 18) of the key (9), emits a signal lasting 15 seconds, after preliminary determination of the environmental conditions. At this moment the driver is already in the immediate vicinity of his vehicle (1). At the same moment the projector (2) of the display arrangement in the vehicle (1) begins the blinking projection of the data, in order to warn that the parking time of the vehicle (1) has expired.

The driver now actuates the unlocking of the vehicle (1) by pushing the selector switch (21). The projector (2) now is turned off and the LCD module (3) is currentless again and thus transparent. After the driver has entered the vehicle (1), he actuates the selector key (24) together with the key (23). Thereupon, the previously recorded message, that is stored in the memory of the microprocessor (13) is replayed over the loud speaker (16) of the key (9) of the microprocessor (13). The driver now writes down this information in his time planner. The selector switch (24) in combination with the

key (22) and the key (23) is used for setting different data or for selecting and/or controlling programs, that are stored in the memory of the microprocessor (13), for example, a program for manually setting the end of parking time at the time of parking in a parking lot with a parking meter, or a program for setting the alarm time or times in % of the expired parking time, or for switching to the "tire pressure check" program.

After inserting the key (9) into the ignition lock (8), the data of the last parking procedure are extinguished by the transceiver (5).

Patent Claims

1. A key and/or SmartCard (9), that is used for unlocking/locking motor vehicle doors and/or for using a motor vehicle (1), with an energy storage (11), a transmitter (10) and a transponder (14), **wherein** the key and/or the SmartCard (9) is equipped with one or more display(s) (20), a microprocessor with timer and memory (13), a signal transmitter with one or more signal sources (16, 18), one or more microphone(s) (17), and several control devices (21, 22, 23, 24).

2. The key and/or SmartCard (9) according to Claim 1, wherein the memory of the microprocessor (13) is used for storing parking data (time moments, time duration, fees, parking places, etc.) and/or for imaging a parking money/parking time account.

3. The key and/or SmartCard (9) according to Claim 1, wherein the transponder (14) is used for storing parking data (time moments, time duration, fees, parking places, etc.) and/or for imaging a parking money/parking time account.

4. The key and/or SmartCard (9) according to Claim 1, wherein the transponder (14) is used for storing parking data (time moments, time duration, fee, parking place, etc.) and/or for imaging a parking money/parking time account and for storing information for identification within the framework of the anti-theft lock.

5. The key and/or SmartCard (9) according to one of the Claims 1 to 4, where the display(s) (20) consists of any number of LED's.

6. The key and/or SmartCard (9) according to one of the Claims 1 to 4, wherein the display(s) (20) consists of any number of LCD modules.

7. The key and/or SmartCard (9) according to one of the Claims 1 to 4, wherein the display(s) (20) changes its color or shape over time as a result of chemical or physical action.

8. The key and /or Smart Card (9) according to one of the Claims 1 to 7, wherein the display(s) (20) is made as a bar.

9. The key and/or SmartCard (9) according to one of the Claims 1 to 8, wherein the microprocessor (13) exchanges data with the transponder (14), the microprocessor (13) brings data read from the transponder (14) unchanged and/or changed for visible display(s) by means of the display(s) (20).

10. The key and/or SmartCard (9) according to one of the Claims 1 to 9, wherein the timer of the microprocessor (13) is equipped with a receiver for receiving a radio signal, e.g. from the Mainflingen DCF 77 transmitter.

11. The key and/or SmartCard (9) according to one of the Claims

1 to 10, wherein the signal transmitter optionally emits optical and/or acoustic and/or vibration signals, the intensity of which is calculated depending on the environmental situation (e.g. engine noise) and the signal strength is adjusted dynamically to the environmental conditions and for this purpose is provided with a microphone (17), a microprocessor (13), a light sensor, an LED (18), a loudspeaker (16), and a vibration element.

12. The key and/or SmartCard (9) according to one of the Claims 1 to 11, wherein the type and/or the intensity of the signal or signals can be adjusted via the control device (21, 22, 23, 24).

13. The key and/or SmartCard (9) according to one of the Claims 1 to 12, wherein the energy storage (11) is charged by an integrated solar cell (12).

14. The key and/or SmartCard (9) according to one of the Claims 1 to 13, wherein the energy storage (11) is charged by an energy-converting flywheel/pendulum device in and/or on the key and/or the SmartCard (9).

15. The key and/or SmartCard (9) according to one of the Claims 1 to 14, wherein the energy storage (11) can be charged wirelessly on a charging device.

16. The key and/or SmartCard (9) according to one of the Claims 1 to 15, wherein the energy storage (11) is charged by a mechanical/electrical connection (19) with a device on the vehicle (1) (e.g. vehicle door lock) or a device in the vehicle (1) (e.g. ignition lock (8)) or a device outside the vehicle (1) (e.g. charging device). /7

17. The key and/or SmartCard (9) according to one of the Claims 1 to 16, wherein the control device (21, 22, 23, 24) consists of any number of keys, switches, adjusting wheels, or knobs or combinations thereof.

18. The key and/or SmartCard (9) according to one of the Claims 1 to 17, wherein the operation takes place, at least partially, by means of a speech receiving, processing, and evaluating device integrated in the key (9), which makes it possible to input data and/or commands by verbal human speech and/or by individual and/or a sequence of tones of the same or different frequency level.

19. The key and/or SmartCard (9) according to one of the Claims 1 to 18, wherein the microphone (17), the loudspeaker (16), the microprocessor with storage and timer (13), and the control device (21, 22, 23, and 24) are used in addition to the speech recording and reproduction.

20. The key and/or SmartCard (9) according to one of the Claims 1 to 19, wherein the transmitter (10) can send commands and/or data to an electronic display arrangement located in the vehicle (1), which carries out programs independently depending on the transmitted commands and/or data and presents data.

21. The key and/or SmartCard according to Claim 20, wherein the transmitter (10) serves simultaneously for locking the vehicle doors and/or the activation of an alarm system in the motor vehicle (1).

22. A key fob for parking fee payment, parking time monitoring, and operating a display arrangement in the vehicle (1) for mounting on

a key ring or similar device, on which a key and/or release component (9) is mounted, that serves for using a vehicle (1), wherein the key fob is equipped with one or more display(s) and one or more memory(ies), a time counting device, one or more signal transmitter(s), a microphone, one or more control device(s), and a transmitter.

23. The device according to Claim 22, wherein the memory is a transponder.

24. The device according to one of the Claims 22 or 23, wherein the display is made of any number of LED's.

25. The device according to one of the Claims 22 or 23, wherein the display is made of any number of LCD modules.

26. The device according to one of the Claims 22 or 23, wherein the display changes the color or form depending on time as a result of chemical or physical action.

27. The device according to one of the Claims 22 to 26, wherein the display is made as a bar.

28. The device according to one of the Claims 22 to 27, wherein the time counting device is made of a programmable microprocessor, a timer, and associated memory.

29. The device according to Claim 28, wherein the time counting device is equipped with a receiver for receiving a radio clock signal, e.g. from the Mainflingen DCF 77 transmitter.

30. The device according to one of the Claims 22 to 29, wherein the signal transmitter optionally transmits optical and/or acoustic

and/or vibration signals, the intensity of which is calculated depending on the environmental situation determined via sensors (e.g. engine noise) and thus dynamically adjusts the signal strength to the environmental conditions and for this purpose is provided with at least one microphone, a microprocessor, a loudspeaker, a light sensor, and an LED.

31. The device according to one of the Claims 22 to 30, wherein the type and/or intensity of the signal or signals can be adjusted via the control device.

32. The device according to one of the Claims 22 to 31, wherein the energy storage is charged by an integrated solar cell.

33. The device according to one of the Claims 22 to 32, wherein the energy storage is charged by an energy-converting flywheel/pendulum device in or on the device.

34. The device according to one of the Claims 22 to 33, wherein the energy storage can be charged wirelessly on a charging device.

35. The device according to one of the Claims 22 to 34, wherein the energy storage is charged via a mechanical/electrical connection with a device on the vehicle (1) (e.g. vehicle door lock) or a device in the vehicle (1) (e.g. cigarette lighter) or a device outside the vehicle (1) (charging device).

36. The device according to one of the Claims 22 to 35, wherein the control device consists of any number of keys, switches, adjusting wheels, or knobs, or combinations.

37. The device according to one of the Claims 22 to 36, wherein

the control, at least partially takes place with a speech receiving, processing, and evaluating device, that makes it possible to input data and/or commands by verbal human speech and/or by individual and/or a sequence of tones of the same or different frequency level.

38. The device according to one of the Claims 22 to 37, wherein the microphone, the loudspeaker, the memory, the microprocessor, and the control device additionally are used for speech recording and reproduction.

39. The device according to one of the Claims 22 to 38, wherein the transmitter can transmit commands and/or data to an electronic display arrangement located in the vehicle (1) according to a wireless data transmission method (e.g. IR, HF, ultrasound), which executes programs independently depending on the transmitted commands and/or data and presents data.

40. The device according to Claim 39, wherein the transmitter independently serves for locking the vehicle doors and/or the activation of an alarm system of a motor vehicle (1).

41. The device according to one of the Claims 22 to 40, wherein the transponder of the device can communicate with a transceiver (5) mounted in or on the vehicle (1).

42. An automatic parking machine (25) with display (27), /8
control device (26), coin slot (31), card reader (32), and receipt printer (33) for use with a device according to one of the Claims 1 to 21 (key) and/or a device according to one of the Claims 22 to 41 (key fob), wherein the automatic parking machine (25) is equipped with at

least one data transmission device and a signal transmitter (30).

43. The device according to Claim 42, wherein the data transmission device consists of a transceiver (28) and/or a radio transmitter (29), the radio transmitter (29) is suited for transmitting coded information (commands and data) to a display located in a motor vehicle (1).

44. A display for a motor vehicle (1) for use with a device according to one of the Claims 1 to 21 (key) and/or a device according to one of the Claims 22 to 41 (key fob) and/or a device according to one of the Claims 42 or 43 (automatic parking machine) with a microprocessor and a receiver, wherein the display arrangement consist of a control device (4), provided with a serial interface, and a display arrangement.

45. The device according to Claim 44, wherein the display arrangement consists of one or more LCD module(s), one or more illumination devices and one or more optically variable layer(s).

46. The device according to Claim 45, wherein the optically variable layer is an electrochrome layer.

47. The device according to Claim 45, wherein the optically variable layer is a gasochrome layer.

48. The device according to one of the Claims 44 to 47, wherein the display arrangement is made of a projector (2) and a projection screen.

49. The device according to one of the Claim48, wherein the projection screen is located at any point in the vehicle (1), outside

of the motor vehicle (1) or within or on the window glass of the motor vehicle (1).

50. The device according to Claim 49, wherein the projection screen is made and/or provided inside or on the window glass of the vehicle (1) by an optical process and/or optical components, for example a holographic-optical refraction grating.

51. The device according to Claim 49, wherein the projection screen is provided with a switchable LCD display (3) and/or another switchable layer.

52. The device according to one of the Claims 44 to 51, wherein the display arrangement is connected with the electric power supply of the vehicle (1) and can receive data from a transceiver (5) and/or a receiver (6) of the central locking system.

53. A method for using a device according to one of the Claims 1 to 21 (key (9)) and/or a device according to one of the Claims 22 to 41 (key fob) with a motor vehicle (1) with integrated transceiver (5) and ignition lock (8), wherein after the ignition lock (8) of the vehicle (1) is set to the zero position, the transceiver (5) of the vehicle (1) transmits the current vehicle clock time to the transponder (14) of the key (1) or the key fob, the signal transmitter of the key (1) or the key fob transmits a signal, and the microprocessor (13) displays the transmitted clock time on the display (20) of the key (9) or the key fob, indicated as beginning of parking time.

54. A method for using a device according to one of the Claims 1 to 21, (key (9)) and/or a device according to one of the Claims 22 to 41 (key fob) with a device according to one of the Claims 42 or 43 (automatic parking machine (25)), wherein after choosing the level of the parking money/parking time funds to be charged on the control device (26) of the automatic parking machine (25) the automatic parking machine (25) displays the amount of money in the display (27), and accepts the amount in the form of coins and/or bills and/or money/credit card via the coin slot (31) and/or the card reader (32) and the parking money/parking time account imaged in the transponder (14) of the key (9) or the key fob, then is loaded via the transceiver (28), the automatic parking machine (25) and/or the key (9) or the key fob transmits a confirmation signal, so that the user is informed concerning the charging of the "electronic parking money/parking time account".

55. The method for using a device according to one of the Claims 1 to 21 (key (9)) and/or a device according to one of the Claims 22 to 41 (key fob) with a device according to one of the Claims 38 or 39 (automatic parking machine (25)), wherein after choosing the parking time on the control device (26) of the automatic parking machine (25) for an individual parking procedure, the payment of the parking fees takes place at the automatic parking machine in such a way that the transceiver (28) of the automatic parking machine (25) reads the vehicle/display code of the transponder (14), deducts the parking fee/parking time from the parking time/parking money account imaged in

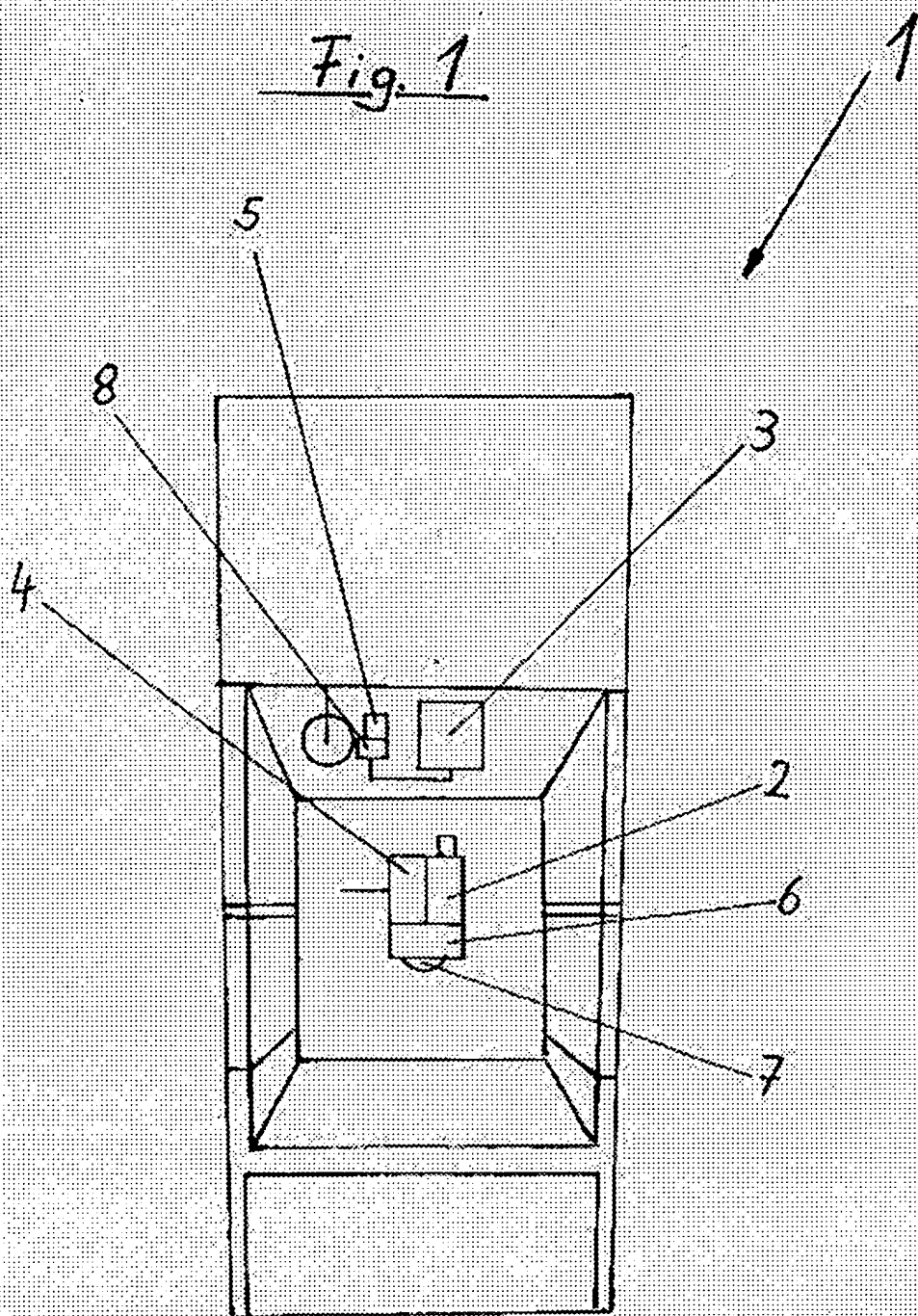
the transponder (14) of the key (9) or the key fob, so that the level of the "electronic parking money/parking time account" is correspondingly reduced, the automatic parking machine (25) transfers the end of the parking time to the transponder (14) of the key (9) or the key fob as "end of parking time", the microprocessor (13) displays the transmitted end of parking time on the display (20) of the key (9) or the key fob with the symbol "PE", the signal transmitter (30) of the automatic parking machine (25) and/or the signal transmitter of the key (9) or the key fob emits a confirmation signal, so that the user is informed concerning the payment of the parking fee.

56. The method of using a device according to one of the Claims 44 to 52 (display arrangement) with a device according to one of the Claims 1 to 21 (key (9)) and/or a device according to one of the Claims 22 to 41 (key fob), wherein the command for operating the display arrangement in a specific mode of operation (e.g. "electronic parking permit") is sent with the transmitter (10) or the key (9) or the key fob to the receiver (4) of the display arrangement or to the receiver (6) of the central locking system or to the transceiver (5) of the vehicle (1), the transceiver (5) of the receiver (6) of the central locking system relays the command via the vehicle power /9 supply to the display device, with the command parking data, that are stored in the transponder (14) of the key (9) or the key fob, are transmitted by the key (9) or the key fob, thereupon the display arrangement presents a preliminarily programmed presentation "e.g. electronic parking permit" with the transmitted "parking data".

57. The method for using a device according to one of the Claims 44 to 52 (display arrangement) with a device according to one of the Claims 42 or 43 (automatic parking machine (25)), wherein the radio transmitter (29) of the automatic parking machine transmits the command for operating the display arrangement in a specific mode of operation (e.g. "electronic parking permit") to the radio receiver of the control device (4) of the display arrangement in the vehicle (1), the command contains a vehicle/display code, and the end of parking time valid for the parking procedure, that is stored in the automatic parking machine (25), is transmitted, the display arrangement verifies the code signal, thereupon, after verification, the display arrangement represents an "electronic parking permit" with the transmitted "end of parking time".

4 pages of drawings appended

Fig. 1



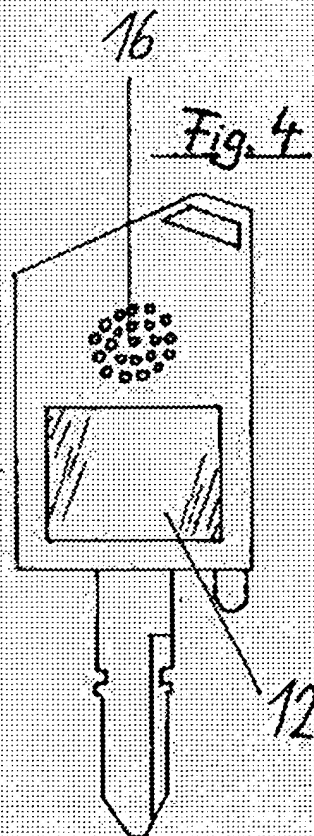
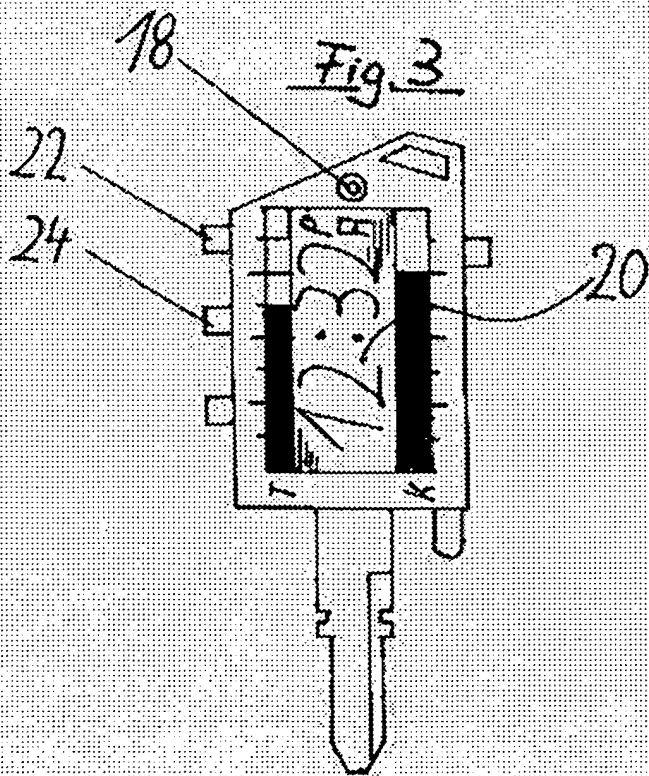
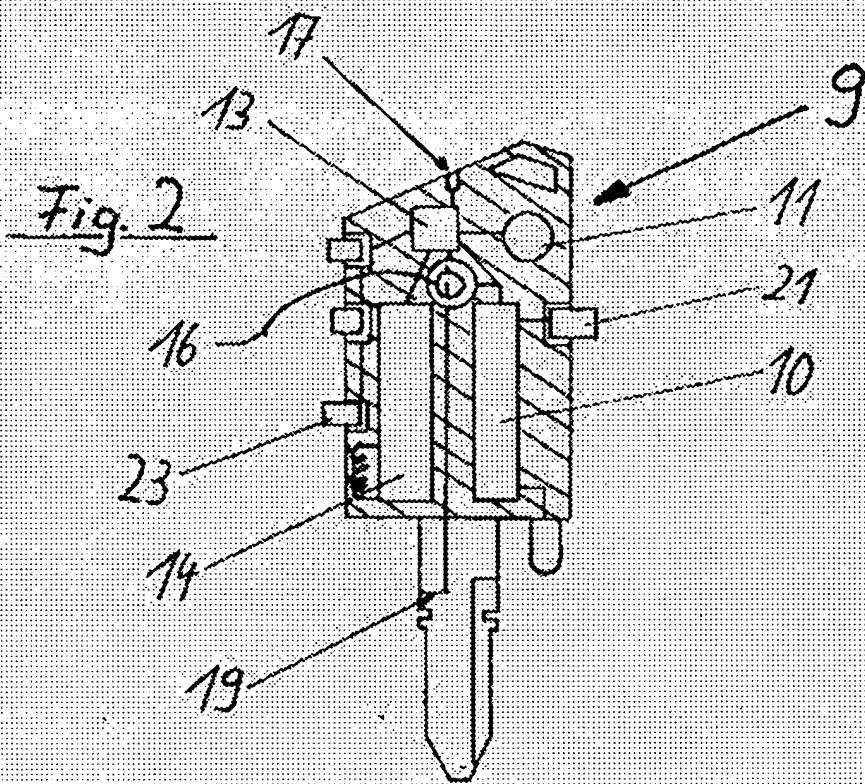
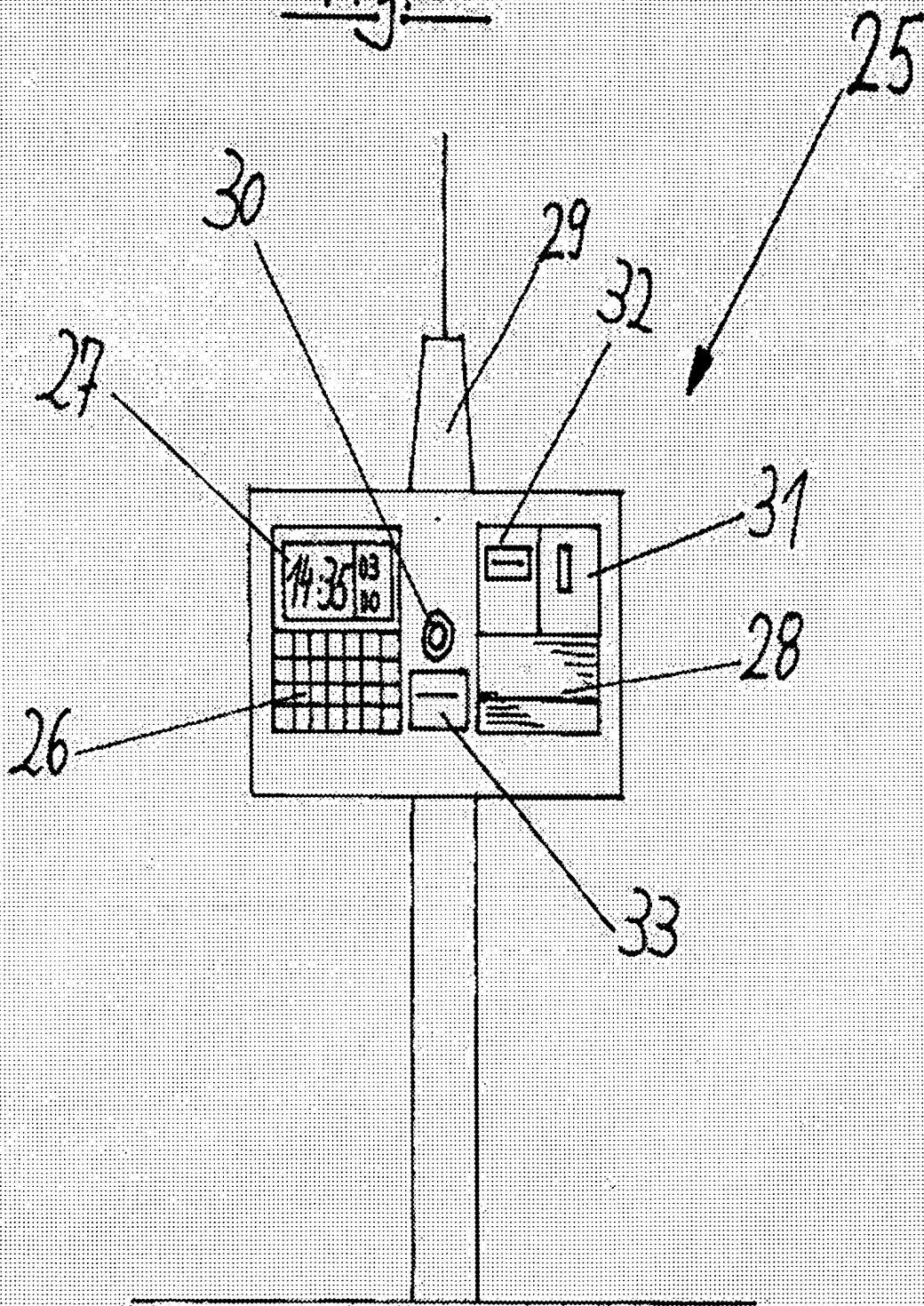


Fig. 5



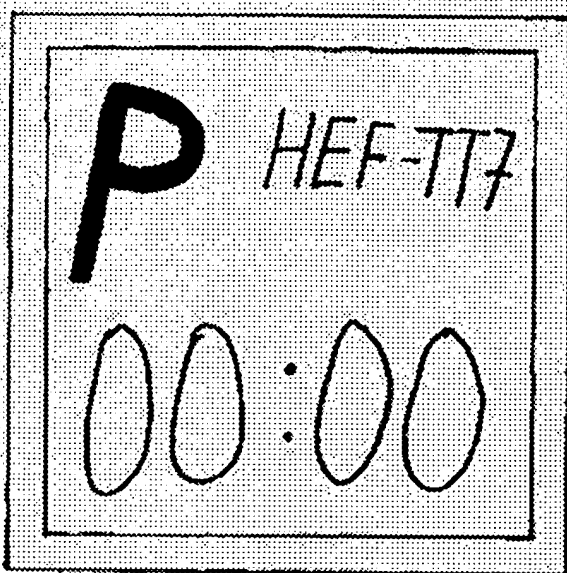


Fig. 6

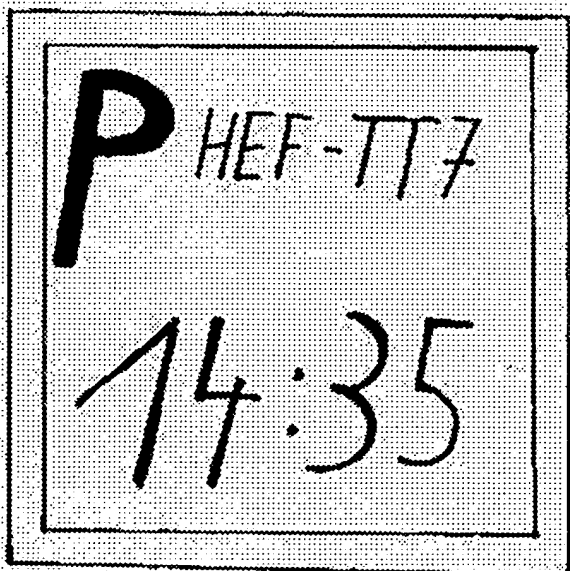


Fig. 7